Stream Planning

Objectives
Students will: (1) identify human activities that negatively effect riparian ecosystems, (2) describe how the impacts of human activities could be minimized or eliminated and (3) describe a direct role that they could play in reducing human impacts.

Curricular Areas
Science, English, Language Arts, Social Studies, Art

California Content Standards
Grades 4-8

Science

3rd Life 3 a, b, c, d, e
4th Life 2 a, b, c; 3 a, b, c; Investigations 6 c
5th Earth 3 a, b, c, d, e; 4 a; Investigations 6 h
6th Earth 2 a, b; Ecology 5 b, c, d, e; Resources 6 b, c; Investigations 7 a, b

Social Studies

3rd 3.1
4th 4.1, 4.4, 4.5

English Language Arts

3rd Write 1.0; Listen/Speaking 1.0
4th Write 1.0; Listen/Speaking 1.0
5th Write 1.0; Listen/Speaking 1.0
6th Write 1.0; Listen/Speaking 1.0
7th Write 1.0; Listen/Speaking 1.0

Method
Students will become land developers and develop a section of land adjacent to a river. After the development is complete, students will observe the effect of the development process and explore possible solutions.

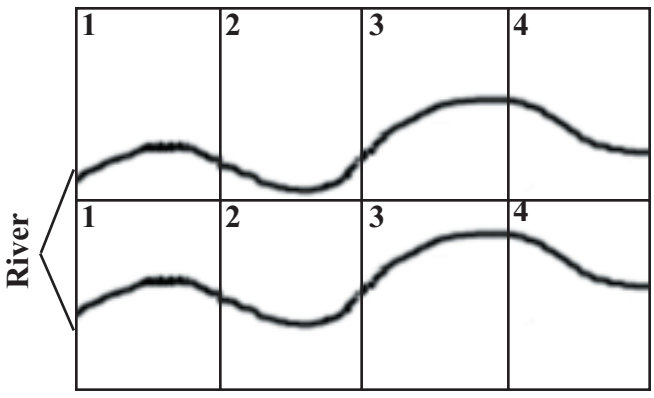
Materials
- Time to complete: (1) 50-minute class period
- 24 to 32 feet of white butcher paper
- Crayons or colored markers
- Copy of "Water We Going to Do" activity sheet, one per group

Background
When humans choose to live and conduct any activity near a river, they affect the ecosystem. Habitat disruption, polluted storm water runoff, water diversion, and riverbed alteration and siltation are among the possible consequences. Impacts to streams occur when the streamside is changed or the land within a watershed is modified.

The quality of water in a stream is a reflection of land uses and natural factors found in its watershed. If soil near a river naturally erodes, chances are the river has sediment and turbidity problems. If the land has stable vegetative cover, erosion is kept in check. When humans develop the land, they often break the sod, cut the forest, build cities, engage in mining, and many other activities that impact the watershed and water quality. Everyone bears responsibility for the health of a watershed and the waterway. Individual actions, both negative and positive, add up. Understanding a river's water quality and quantity involves observing the condition of the complete watershed.

Procedure
Before class:

Using blue markers, watercolor or tempera, draw and color a river on butcher paper (see illustration). River bank lines should be about 12 inches apart. Make a grid, divide the river in half lengthwise and divide widthwise so that each student will have a waterfront and land section. Number the sections on one side of the river in sequential order, placing



numbers in upper left-hand corners and repeat for the other side. Cut out the sections.

Part I

1. Inform students that they have been given a section of property along a river and one million dollars. They may develop their land any way they wish. Give each student a section of river. Explain that the blue is water and the blank space is the land they own. They can farm or ranch, build a resort, a housing development, a factory, or parks, plant a forest, or do mining – whatever they like.
2. Have the students draw their plans for their property. When drawings are complete have students look at the number on their section. Explain that each piece is actually a part of a puzzle. Starting with number one, have students assemble their pieces. To assemble the stream, pathway, and adjacent land area in proper order, the *ones* should face each other with the *twos* next to them and so forth. Post the sections on a wall (or walls, depending on the length of your river and your room).
3. Have students share their plans.

Part II

4. Up until now, the students have not been given any specific information about the river. Now, go back and give them some details. Draw in or label some natural features such as salmon spawning gravel beds, shallow water nursery areas for salmon fry, marshy habitat for waterfowl, a stand of trees for nesting herons, and so forth. To make the discussion more meaningful, place the natural features in a vulnerable place according to the students' plans for development. For example, place salmon spawning areas in a place that potentially would receive siltation from human activities or that people would be likely to stand on (for example, fishing or swimming areas). The heron nesting trees may be placed in an area with lots of human activity.
5. Now that the students know more about the river they have developed, ask them to identify all the potential problems that they can think of for the ecosystem. Divide the class into groups of three or four students. Provide each group with a copy of the "Water We Going to Do" student activity sheet. Have each group record all of the potential problems they can think of for the entire river corridor. Once the problems are recorded from the group, record possible solutions for each problem. Can some problems be solved completely or can they only be minimized?
6. Have the groups share their ideas. Make a class chart of problems and solutions.
7. Have students think of all the ways that they themselves could be part of the solution. What can they do to help solve or minimize each of the problems? Students working in their groups will complete the "Me" section. Have the groups share their ideas with the class.
   a. Which problems were easiest to solve? Which problems would take more effort?
   b. How would the students' plans for development have changed if they knew more about the river before they developed it? Who needs to be educated about river ecology? How might this occur? (Scientific studies, laws and regulations, public awareness, and volunteer efforts)
   c. Is there a river nearby that might have some of the problems the students identified? What can each student do to solve or minimize those problems? Are there any projects the students would like to work on to educate other people about how they can help?
   d. What is the significance of the statement, "everyone lives downstream?"

Extensions

Design a community that uses their best management practices and allows for minimum contributions of pollutants.

Evaluation

- Describe the effects that large quantities of the following things might have on an aquatic

Activity adapted with permission from *Some Things Fishy, A Teacher's Guide for the Feather River Fish Hatchery,* published by the CA Department of Water Resources, Office of Education.

Water We Going to Do?

Problem	Solution	Me